County of Sacramento
California

For the Agenda of:
March 14, 2000, 3:30 p.m.

TO: Board of Supervisors

FROM: Department of Health and Human Services

SUBJECT: **HPTO/00-059. Report Back (February 8, 2000, #39), Analysis of Research Regarding Water Fluoridation and Policy Recommendation.**

Contact: Glennah Trochet, M.D. (875-5881)

Recommendations:

It is recommended that your Board

1. Receive and file this report analyzing scientific data regarding community water fluoridation.

2. Adopt the attached resolution endorsing community water fluoridation and urging all water districts in Sacramento County to supply fluoridated water to their customers.

Background:

As a result of hearings held on December 7, 1999 and February 8, 2000, your Board has received conflicting information regarding the benefits and dangers of community water fluoridation.

On February 8, 2000 your Board directed the County Health Officer and the Department of Health and Human Services to review and analyze information regarding the fluoridation of community water supplies. This report is in response to that request.

Methods:

The material sent to your Board regarding community water fluoridation was a mixture of letters, newspaper articles, press releases and reprints of articles. Many of the letters contained citations of articles and other press releases, newspaper articles etc.

The material was organized into opinion pieces and content that offered or cited scientific data. The opinion pieces were not analyzed; however, global assertions that appeared as fact in these pieces were tested against verifiable information. Bibliographies of articles, (many lists contained more than twenty citations,) were analyzed. Published articles were also reviewed.

In order to review the scientific citations, we then applied certain standards:

1. The articles must be published in an accepted peer-reviewed journal. This is the only way we could evaluate scientific authority. Cited articles in non-peer reviewed journals, foreign articles with no translation, and opinion pieces were not evaluated.

2. The articles must pertain to levels of fluoride in community water and health effects of this. We discarded citations that were irrelevant.

3. The quality of the study was evaluated. High quality, peer-reviewed articles and studies have different levels of statistical validity. Even if data appear to be statistically valid, unrecognized biases can contaminate the data. Statistical validation simply suggests truth. Only multiple studies, all statistically valid, each concluding similar findings, biologically plausible, with increasing exposure correlating with increasing effect, will point to causation rather than a mere association between cause and effect.

Common types of studies that yield valid data are:

a. Prospective studies. Patients are randomly assigned to a study group or a control group. Neither the researchers nor the patients are aware of which is the study group and which is the control group. These studies are very long and expensive to perform.

b. Retrospective case control studies. The treated cases are known, and control patients are randomly chosen and matched by age, ethnicity, socioeconomic status, etc. These studies are faster and less expensive to conduct, but produce data of lesser quality.

c. Observational studies, sometimes matched with historical controls, are much less difficult to complete. The data obtained may be more difficult to interpret. Observational studies can be divided into:

i. Epidemiologic studies, which concentrate on the occurrence of disease among individuals in relation to possible risk factors.

ii. Ecological studies which explore associations between environment or occupation, and disease. These are the crudest studies, and are considered to generate hypotheses rather than test hypotheses.

To evaluate data one must apply critical thinking. The table below lists the skills needed for this:

SKILLS	SIMPLE TECHNIQUES
1. Ask questions: be willing to wonder	Start by asking "Why?"
2. Define the problem	Restate the issue several different ways so it is clear.
3. Examine the evidence	Ask what evidence supports or refutes the claim. Is it reliable?
4. Analyze assumptions and biases	List the evidence on which each part of the argument is based. The assumptions and biases will be unsupported.
5. Avoid emotional reasoning	Identify emotional influence and "gut feelings" in the arguments, and exclude them.
6. Don't oversimplify	Do not allow generalizations from too little evidence.
7. Consider other interpretations	Make sure alternate views are included in the discussion.
8. Tolerate uncertainty	Be ready to accept tentative answers when evidence is incomplete, and new answers when further evidence warrants them.

To examine claims, we applied evidential reasoning. The table below lists the rules of evidential reasoning:

Falsifiability	Conceive of all evidence that would prove the claim false.
Logic	Argument must be sound.
Comprehensiveness	Must use all the available evidence.
Honesty	Evaluate evidence without self-deception.
Replicability	Evidence must be repeatable.
Sufficiency	1. Burden of proof rests on the claimant. 2. Extraordinary claims require extraordinary evidence. 3. Authority and/or testimony is always inadequate.

Findings

Applying the standards and methodologies discussed above, we reviewed the scientific research addressing the issues presented to your Board. These are our findings. A bibliography is included in Section Three of this report, "Literature Review."

1. There is no association between water fluoridation and increased risk of hip fracture.
   - We reviewed 18 scientific journal articles that support this assertion.
   - We reviewed 4 scientific journal articles that contradict this assertion.

2. There is no link between water fluoridation and cancer.
   - We reviewed 28 scientific journal articles that support this assertion.
   - We reviewed 3 scientific journal articles that contradict this assertion.

3. There is no link between water fluoridation and Alzheimer's disease, other neurologic problems or behavior.
   - We reviewed 2 scientific journal articles that support this assertion.
   - We found no scientific journal articles that contradict this assertion.

4. Fluoride is being investigated as a treatment for Alzheimer's disease.
   - We found 2 scientific journal articles that address this issue.

5. Fluoride is a treatment for osteoporosis.
   - We reviewed 30 scientific journal articles that support this assertion.
   - We reviewed 13 scientific journal articles that contradict this assertion.

6. There were 32 articles or citations, submitted to your Board, which do not meet our criteria for validity because:
   - They were not published in accepted peer-reviewed scientific journals;
   - They did not directly address community water fluoridation; or
   - They were not statistically valid.

7. We found several global assertions using emotionally laden language, such as "poisoning our water supply" or "shunning fluoridation" which we analyzed according to our criteria for critical thinking. We also reviewed some references cited in opposition to community water fluoridation, a thorough reading of the cited material led to a conclusion opposite to the claims. A discussion of these issues is included in Section Four of this report, "Setting the Record Straight."

8. Section Five of this report includes material that reviews the literature that supports the efficacy of community water fluoridation and answers questions regarding this public health strategy.

Conclusions:

1. The preponderance of the evidence supports fluoridation of community water as a safe and effective method of preventing dental caries in the population. It improves dental health of children and adults, although children benefit to a greater degree.

2. Fluoridation of community water may lead to a small increase in the percentage of mild or very mild dental fluorosis as compared to nonfluoridated communities.

3. There is no verifiable association shown between optimal fluoridation of community water and hip fractures, bone cancer, severe dental fluorosis or severe bone fluorosis, Alzheimer's disease or lead poisoning.

Respectfully submitted,

James W. Hunt, Director
Department of Health and Human Services

Glennah Trochet, M.D.
County Health Officer

APPROVED:

Terry Schutten
County Executive

By_____
Penelope Clarke, Administrator
Public Protection and Human
Assistance Agency

cc: County Executive
Administrator, Public Protection and Human Assistance Agency
Administrator, Public Works Agency
Director, Department of Health and Human Services
County Health Officer

References:

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Lipps JH. Beyond Reason: Science in the Mass Media. Evolution! Facts & Fallacies. Academic Press, San Diego. Chapter 4, pp 71-90.